WHAT IS CLAIMED IS:

1. A burner having a fuel distributor configured to inject a fuel supplied from a fuel supply device; and an air injector placed such that the air injector surrounds the fuel distributor so as to form a combustion space around the fuel distributor and having an air injection hole through which air supplied from an air supply device is injected, the air injected from the air injection hole and the fuel injected from the fuel distributor being combusted to allow a flame to be generated in the combustion space, the burner comprising:

a temperature detector for detecting a temperature of the combustion space, the temperature detector having a temperature detecting portion located within the air injection hole or in an air flow passage of the combustion space; and

a flame detector for detecting a condition of the flame within the combustion space, based on the temperature detected by the temperature detector.

2. The burner according to Claim 1, wherein the temperature detector is placed such that the temperature detecting portion is located within the air injection hole or within the combustion space in the vicinity of the air injection hole.

3. The burner according to Claim 1, wherein the temperature detector is placed so as to penetrate the air injector.

4. The burner according to Claim 1, wherein the temperature detecting portion of the temperature detector is thermally insulated from an inner face of the air injection hole.

5. The burner according to Claim 4, wherein a gap is formed between the temperature detector and the inner face of the air injection hole, and a width of the gap is substantially uniform over an outer periphery of the temperature detector.

6. The burner according to Claim 4, wherein the air injector has a plurality of air injection holes, and a cross-sectional area of the gap between the air injection hole within which the temperature detector is provided and the temperature detector is substantially equal to a cross-sectional area of the air injection hole within which the temperature detector is not provided.

7. The burner according to Claim 1, wherein the temperature detector has the temperature detecting portion at an end portion thereof, and a body of the temperature detector is contained within the air injector.

8. The burner according to Claim 7, wherein an end portion of the temperature detecting portion side of the temperature detector is substantially covered with an oxidation film.

9. The burner according to Claim 7, wherein an end portion of the temperature detecting portion side of the temperature detector is substantially hemispherical.

10. The burner according to Claim 1, wherein the temperature detector is a sheath-shaped thermo couple.

11. The burner according to Claim 1, wherein a plurality of temperature detectors are provided at different positions within the combustion space to detect temperatures of different regions within the combustion space.

12. The burner according to Claim 1, wherein the combustion space has a cross-sectional area that increases toward a flame radiation direction.

13. The burner according to Claim 1, further comprising:

an electrode contained within the fuel distributor and having an end portion that protrudes into the combustion space; and

an ignition circuit electrically connected to the electrode, for applying a voltage to the electrode to allow electric discharge from the electrode to occur within the combustion space.

14. The burner according to Claim 13, further comprising:

a switch configured to perform switching so that the electrode is connected to the ignition circuit during ignition, and the electrode is connected to the flame detector when the flame detector judges that ignition has occurred based on temperature information of the combustion space from the temperature detector, wherein the flame detector detects the flame based on the temperature information from the temperature detector and detects the flame based on an output current from the electrode.

15. The burner according to Claim 14, wherein the end portion of the electrode that protrudes into the combustion space is placed in a region different from a region

of the combustion space in which the temperature detector is placed, to detect the flame in the region which is different from the region where the flame is detected by the temperature detector.

16. The burner according to Claim 15, wherein the temperature detector detects the flame in an upper region of the combustion space in the flame radiation direction, and the electrode detects the flame in a lower region of the combustion space in the flame radiation direction.

17. A hydrogen generator comprising:

a burner having a fuel distributor configured to inject a fuel supplied from a fuel supply device; and an air injector placed such that the air injector surrounds the fuel distributor so as to contain the fuel distributor and form a combustion space around the fuel distributor and having an air injection hole through which air supplied from an air supply device is injected, the air injected from the air injection hole and the fuel injected from the fuel distributor being combusted to allow a flame to be generated in the combustion space, the burner including:

a temperature detector for detecting a temperature of the combustion space, the temperature detector having a temperature detecting portion located within the air injection hole or in an air flow passage of the combustion space; and

a flame detector for detecting a condition of the flame within the combustion space, based on the temperature detected by the temperature detector, and

a reformer for generating a reformed gas containing hydrogen by a reforming reaction of a feed material including a compound containing at least

carbon and hydrogen, the burner being configured to heat the reformer.

18. A fuel cell power generation system comprising:

a hydrogen generator including:

a burner having a fuel distributor configured to inject a fuel supplied from a fuel supply device; and an air injector placed such that the air injector surrounds the fuel distributor so as to contain the fuel distributor and form a combustion space around the fuel distributor and having an air injection hole through which air supplied from an air supply device is injected, the air injected from the air injection hole and the fuel injected from the fuel distributor being combusted to allow a flame to be generated in the combustion space, the burner including:

a temperature detector for detecting a temperature of the combustion space, the temperature detector having a temperature detecting portion located within the air injection hole or in an air flow passage of the combustion space; and

a flame detector for detecting a condition of the flame within the combustion space, based on the temperature detected by the temperature detector, and

a reformer for generating a reformed gas containing hydrogen by a reforming reaction of a feed material including a compound containing at least carbon and hydrogen, the burner being configured to heat the reformer; and

a fuel cell configured to generate a power using a gas containing hydrogen as a major component which is supplied from the hydrogen generator to a fuel electrode and an oxidizing gas supplied to an oxidizing electrode.